Gastric Extranodal Marginal Zone Lymphoma of Mucosa-Associated Lymphoid Tissue (MALT Lymphoma)

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Case#1 Presentation: 70yo female

- PMH GERD, hiatal hernia, eczema, and ulcerative colitis (UC) in her 20s, well controlled on sulfasalazine.

- Presented with asymptomatic gastric mucosal thickening found incidentally on CT of A/P as part of active surveillance for her UC.
  - Noted as a large polyp in the cardia and 2 smaller polyps in the body of the stomach.
Case#1 Presentation: 70yo female

- What’s the ddx and next step in management?
Case#1 Presentation: 70yo female

- DDx includes
  - Gastritis
  - Crohn’s disease
  - Menetrier’s disease
  - Adenocarcinoma
  - Lymphoma
  - Stromal tumors
  - Polyps
MZL Introduction

• 3rd most common type of B-cell NHL (after DLBCL and follicular lymphoma)
  – MZL accounts for roughly 5-10% of NHL
  – MALT is the most common subtype of MZL, roughly 70%
    • Splenic MZL ~10%, and nodal MZL ~20% of cases.

• Infections (ie, H. pylori, HCV) and autoimmune conditions (ie, Sjögren’s, Hashimoto’s) are predisposing factors
  – Chronic inflammation -> immune response -> expand B-cell clones -> acquisition of mutations -> deregulated growth

• Can arise in GI tract > orbit > lung > skin

• Incidence increases with age
Predisposing Factors in MZL

- Infections
- Autoimmune
- Genetic predisposition

### Table 1. Anatomical Distribution of Predisposing Conditions and Molecular Features of Marginal-Zone Lymphomas (MZLs).

<table>
<thead>
<tr>
<th>Site of Disease</th>
<th>Infectious Agent</th>
<th>Autoimmune Condition</th>
<th>Biased Immunoglobulin-Gene Usage</th>
<th>Recurrent Translocations</th>
<th>Recurrent Copy-No. Aberrations</th>
<th>Site-Specific Gene Mutations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stomach</td>
<td><em>Helicobacter pylori</em></td>
<td>—</td>
<td>IGHV3–23</td>
<td>t(11;18)(q21;q21) BIRC3/MALT1</td>
<td>+3, +18</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>t(14;18)(q32;q21) IGH/MALT1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>t(1;14)(p22;q32) BCL10/IGH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocular adnexa</td>
<td><em>Chlamydia psittaci</em></td>
<td>Sjögren’s syndrome (in lacrimal gland MZL)</td>
<td>IGHV4–34</td>
<td>t(14;18)(q32;q21) IGH/MALT1</td>
<td>+3, +18</td>
<td>TNFAIP3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>t(3;14)(p14.1;q32) FOXP1/IGH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td><em>Achromobacter xylosidans</em></td>
<td>Lymphocytic interstitial pneumonia</td>
<td>—</td>
<td>t(11;18)(q21;q21) BIRC3/MALT1</td>
<td>+3, +18</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>t(14;18)(q32;q21) IGH/MALT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intestine</td>
<td><em>Campylobacter jejuni</em></td>
<td>—</td>
<td>—</td>
<td>t(11;18)(q21;q21) BIRC3/MALT1</td>
<td>+3, +18</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>t(1;14)(p22;q32) BCL10/IGH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin</td>
<td><em>Borrelia burgdorferi</em></td>
<td>—</td>
<td>—</td>
<td>t(14;18)(q32;q21) IGH/MALT1</td>
<td>+3, +18</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>t(3;14)(p14.1;q32) FOXP1/IGH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salivary gland</td>
<td>—</td>
<td>Sjögren’s syndrome</td>
<td>IGHV1–69</td>
<td>t(14;18)(q32;q21) IGH/MALT1</td>
<td>+3, +18</td>
<td>TBL1XRI, GPR34</td>
</tr>
<tr>
<td>Thyroid</td>
<td>—</td>
<td>Hashimoto’s thyroiditis</td>
<td>IGHV3–23</td>
<td>t(14;18)(q32;q21) IGH/MALT1</td>
<td>+3, +18</td>
<td>TET2, TNFRSF14, CD274</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>t(3;14)(p14.1;q32) FOXP1/IGH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lymph node</td>
<td>Hepatitis C virus</td>
<td>—</td>
<td>IGHV4–34</td>
<td>—</td>
<td>+3, +18</td>
<td>KLF2, NOTCH2, PTPRD</td>
</tr>
<tr>
<td>Spleen</td>
<td>Hepatitis C virus</td>
<td>—</td>
<td>IGHV1–2*04</td>
<td>t(2;7)(p11;q21) IGK/CDK6</td>
<td>+3, +18, del(7q31–32)</td>
<td>KLF2, NOTCH2</td>
</tr>
</tbody>
</table>
EMZL Common Gene Alterations

- Mutational landscape & ddx of B-cell neoplasia

ROSSI, Bertoni, Zucca NEJM 2-22
Work-up

- Complete H&P
- Labs: CBC, CMP, LDH, HepB, HepC
- Imaging: PET/CT or CT C/A/P
- Biopsy: endoscopy, not FNA
  - H. pylori testing (may not be + in ~10% of pts)
  - PCR or FISH for t(11;18)
    - Associated with locally advanced disease and tumor non-response to antibiotics
  - IHC & Flow markers
    - Typically CD5-, CD10-, CD20+, CD23 +/-, CD43 +/-, cyclin D1-, and BCL2- follicles
Work-up

• Additional/other
  – Other testing for H. pylori in case negative on IHC (ie, stool antigen test or urea breath test)
  – EUS may be helpful in evaluating depth of involvement if H. pylori pos and abx planned
  – TTE if planning anthracycline-based systemic tx
  – BMBx +/- aspirate in select cases
  – Fertility preservation
Case#1 Presentation: 70yo female

- EGD demonstrated a single, non-bleeding, semi-sessile polyp in the cardia, and 2 smaller polyps in the body.
- Colonoscopy with stable UC changes
Case#1 Presentation: 70yo female

- Biopsy= extranodal marginal zone lymphoma (MZL)* of mucosa-associated lymphoid tissue (MALT) lymphoma.
  - Dense infiltrate of small monotonous appearing CD20+ lymphocytes, negative for CD3-, CD5-, CD10-, CD21-, CD43-
  - H. pylori negative by IHC

*Per NCCN nongastric MALT lymphoma was recently changed to extranodal marginal zone lymphoma of nongastric site
Case#1 Presentation: 70yo female

• Labs:
  – CBC & CMP WNL; LDH mildly elevated; HepC/HepB/HIV neg
  – BMBx without lymphoma
  – H. pylori stool antigen negative

*Per NCCN nongastric MALT lymphoma was recently changed to extranodal marginal zone lymphoma of nongastric site*
Case#1 Presentation: 70yo female

- PET/CT:
  - Gastric mass with SUV 10.1 measuring 7.5 x 3.2 cm with an additional component measuring 3.6 x 2.1 cm. No other disease.

- How would you stage the patient?

*Per NCCN nongastric MALT lymphoma was recently changed to extranodal marginal zone lymphoma of nongastric site*
# Staging

## Comparison of different staging systems

<table>
<thead>
<tr>
<th>Staging System</th>
<th>Lugano Modification of Ann Arbor Staging System</th>
<th>TNM Staging System Adapted for Gastric Lymphoma</th>
<th>Tumor Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage I</strong></td>
<td>Conference to GI tract&lt;sup&gt;a&lt;/sup&gt;</td>
<td>T1 N0 M0</td>
<td>Mucosa, submucosa</td>
</tr>
<tr>
<td>I₁ = mucosa, submucosa</td>
<td>I&lt;sub&gt;E&lt;/sub&gt;</td>
<td>T1 N0 M0</td>
<td>Mucosa, submucosa</td>
</tr>
<tr>
<td>I₂ = muscularis propria, serosa</td>
<td>I&lt;sub&gt;E&lt;/sub&gt;</td>
<td>T2 N0 M0</td>
<td>Muscularis propria</td>
</tr>
<tr>
<td><strong>Stage II</strong></td>
<td>Extending into abdomen</td>
<td>T3 N0 M0</td>
<td>Serosa</td>
</tr>
<tr>
<td>II₁ = local nodal involvement</td>
<td>II&lt;sub&gt;E&lt;/sub&gt;</td>
<td>T1-3 N1 M0</td>
<td>Perigastric lymph nodes</td>
</tr>
<tr>
<td>II₂ = distant nodal involvement</td>
<td>II&lt;sub&gt;E&lt;/sub&gt;</td>
<td>T1-3 N2 M0</td>
<td>More distant regional lymph nodes</td>
</tr>
<tr>
<td><strong>Stage IIE</strong></td>
<td>Penetration of serosa to involve adjacent organs or tissues</td>
<td>T4 N0 M0</td>
<td>Invasion of adjacent structures</td>
</tr>
<tr>
<td><strong>Stage IV</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Disseminated extranodal involvement or concomitant supradiaphragmatic nodal involvement</td>
<td>T1-4 N3 M0</td>
<td>Lymph nodes on both sides of the diaphragm/distant metastases (eg, bone marrow or additional extranodal sites)</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>T1-4 N0-3 M1</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Mucosa, submucosa, muscularis propria, serosa

<sup>b</sup> Lymph nodes on both sides of the diaphragm/distant metastases (eg, bone marrow or additional extranodal sites)
Case#1 Presentation: 70yo female

• Given a single extranodal site (gastric mass) without nodal or distant metastases, patient is staged as stage IE disease.

• What do you recommend for her?
Radiation in Gastric MALT

- RR out of MSKCC 1991 – 2017
- N=178 predominately stage I (86%); stage II (7%) and IV (7%) dz
- *H. pylori* negative or persistent *H. pylori*+ s/p abx
- Median age 63y; MFU 6.2 years
- Median XRT dose 30 Gy in 1.5 Gy/F to stomach & adjacent nodes
- AEs: dyspepsia (most common); 1% rate of G3 esophageal stricture requiring dilation; 1.6% rate of in-field 2nd malignancy
- **10y outcomes include LF 10%, DF 15%, OS 80%, PFS 60%**

Yahalom et al; Blood Adv. 2021
Radiation in Gastric MALT

Yahalom et al; Blood Adv. 2021
## Treatment Paradigm

<table>
<thead>
<tr>
<th>Stage</th>
<th>Setting</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-II</td>
<td>H. Pylori pos; t(11;18) neg or unknown</td>
<td>• Antibiotics; if with persistent dz -&gt; ISRT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If persistent H. pylori+ with PR -&gt; 2nd course of abx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PD or symptomatic dz -&gt; ISRT + 2nd course abx</td>
</tr>
<tr>
<td></td>
<td>H. pylori pos; t(11;18) pos</td>
<td>Antibiotics and ISRT (or rituximab if XRT contraindicated)</td>
</tr>
<tr>
<td></td>
<td>H. Pylori neg</td>
<td>ISRT (or rituximab if XRT contraindicated)</td>
</tr>
<tr>
<td></td>
<td>Persistent &amp; symptomatic dz</td>
<td>s/p ISRT or rituximab -&gt; systemic therapy</td>
</tr>
<tr>
<td></td>
<td>Persistent &amp; symptomatic dz</td>
<td>s/p ISRT or rituximab -&gt; systemic therapy</td>
</tr>
<tr>
<td>IIE, II$_2$, IV</td>
<td>Asymptomatic</td>
<td>Observation <em>(see next slide)</em></td>
</tr>
<tr>
<td></td>
<td>Symptomatic, bulky dz, steady progression</td>
<td>Systemic therapy or palliative ISRT</td>
</tr>
</tbody>
</table>

Antibiotics= triple tx (PPI, clarithromycin, amoxicillin) or quadruple tx with bismuth salicylate
Stages II-IV Observation

• Continuous evaluation for indications to treat. Criteria include:
  – Patient preference
  – Symptomatic disease (ie, GIB, early satiety)
  – End-organ dysfunction, ie AKI
  – Bulky disease causing symptoms
  – Persistent or rapid growth rate

• Palliative ISRT, systemic therapy, or enrollment in clinical trial (given incurability of dz) may be pursued
  – Resection limited to life-threatening symptoms (hemorrhage)
  – Total gastrectomy not recommended given significant long-term morbidity
Few Words on Systemic Therapy

• Recommended for patients with persistent or progressive disease as noted above
  – Bendamustine + rituximab
  – CHOP (cyclophosphamide, doxorubicin, vincristine, prednisone) + rituximab
  – CVP (cyclophosphamide, vincristine, prednisone) + rituximab
  – Rituximab (375 mg/m2 weekly for 4 doses)

• For elderly patients or poor KPS
  – Rituximab (375 mg/m2 weekly for 4 doses)
  – Chlorambucil +/- rituximab
  – Cyclophosphamide +/- rituximab
Role for Antibiotics?

- Indicated for patients with H. pylori mediated dz (histopath and/or stool PCR) – not our pt
- Prospective German single-arm study of n=120 pts with stage I\textsubscript{1E} disease
- Tx:
  - 1\textsuperscript{st} line: PPI, amoxicillin
  - 2\textsuperscript{nd} line: PPI, flagyl, clarithromycin
- MFU 75 months
- 5y OS 90%
- Histologic CR 80%
- t(11;18) associated with higher risk of relapse or no response

Wündisch et al; JCO 2005
Radiation Dose

• ISRT= 24 to 30 Gy in 1.5 Gy per fraction, both definitive and salvage, given high radiosensitivity
  – Dose-reduction per MDACC series (see next slide)
  – Ongoing trials evaluating lower dosing

• Palliative= 2 Gy x 2 fractions or 4 Gy x 1 fraction, may be repeated up to 30 Gy
Radiation Dose Reduction

- Small series of n=32 pts with gastric MALT out of MDACC
- Median dose 30 Gy (n=21) and 24 Gy (n=11); MFU 55 mos
- Post-RT bx with CR in all patient
- 2y OS 97%, FFLTF 100%
- Small sample size for meaningful conclusions though lower dose was not associated with treatment failure

Pinnix et. al, IJROBP 2019
Current Clinical Trials

• 4 Gy in 2 fractions, phase 1 trial MDACC.
  – Assessing complete gastric response at 1-year post-tx.

• n=24; completed accrual early 2023, data is maturing.

• H. pylori testing must be negative within 6 mos prior to tx.

• Pts excluded if have DLBCL, follicular lymphoma, CLL/SLL, bulky dz >10 cm in any dimension.
Current Clinical Trials

• 20 Gy in 10 fractions, phase 2 single-arm non-inferiority trial (compared to 30 Gy ISRT) out of Germany.
  – Assessing 6-month treatment response.
• n=83; currently accruing.
• Including pts with either MZL or FL, stages I-II localized to stomach or duodenum.
• H. pylori negative of abx resistant.
• Pts excluded if have prior GI RT, stage III-IV, HIV+, acute HBV/HCV infection, IBD.

ClinicalTrials.gov Identifier: NCT04097067
Treatment Planning

• Sim
  – Supine, arms up, mold
  – NPO 4-6 hours to minimize gastric distention/size
  – Small amount of oral contrast to help delineate target
    • If used, image before & after contrast to account for stomach distension
  – 4DCT or DIBH to account for/minimize movement of stomach

• 3D (AP/PA or 4 fields) or IMRT, using CT or MR
  – NPO 4-6 hours prior to RT
  – Anti-emetic 30-60 minutes prior to RT
ISRT Radiation Volumes

- **GTV** = pre-bx gross dz
- **CTV** = GTV + stomach from GEJ to beyond duodenal bulb, including wall
  - Entire organ is included, lymphoma is often multifocal
  - No elective nodal irradiation; may include perigastric nodes if visible
- **ITV** = determined by 4DCT
  - If no 4DCT performed, add 1-2cm to CTV to account for movement
- **PTV** = CTV or ITV + 0.5-1 cm
Radiation Volumes

• Example contour
  – Pink = CTVinspiration
  – Yellow = CTVexpiration

• Contouring atlas
  – Yahalom et. al, IJROBP 2015
  – eContour cases
Constraints

- ILROG guideline (Wirth et al IJROBP 2020)

**Table 1** Dose and volume considerations

<table>
<thead>
<tr>
<th></th>
<th>Optimal*</th>
<th>Acceptable†</th>
<th>If necessary‡</th>
<th>Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart (89, 145, 146)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (Gy)</td>
<td>&lt;5</td>
<td>5-10</td>
<td>10-18</td>
<td>Coronary arteries and left ventricle</td>
</tr>
<tr>
<td>V15</td>
<td>&lt;10%</td>
<td>10%-25%</td>
<td>25%-35%</td>
<td></td>
</tr>
<tr>
<td>V30</td>
<td>&lt;15%</td>
<td>15%-20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung (147)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V5</td>
<td>&lt;35%</td>
<td>35%-45%</td>
<td>45%-55%</td>
<td></td>
</tr>
<tr>
<td>V20</td>
<td>&lt;20%</td>
<td>20%-28%</td>
<td>28%-35%</td>
<td></td>
</tr>
<tr>
<td>Mean (Gy)</td>
<td>&lt;8</td>
<td>8-12</td>
<td>12-15</td>
<td></td>
</tr>
<tr>
<td>Thyroid (148)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V25</td>
<td>&lt;62.5%</td>
<td></td>
<td></td>
<td>Whole thyroid</td>
</tr>
<tr>
<td>Breast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (Gy)</td>
<td>&lt;4</td>
<td>4-15</td>
<td>&gt;15</td>
<td>Glandular tissue</td>
</tr>
<tr>
<td>V4</td>
<td>&lt;10%</td>
<td>10%-20%</td>
<td>&gt;20%</td>
<td></td>
</tr>
<tr>
<td>V10</td>
<td>&lt;10%</td>
<td>&gt;10%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For favorable disease, small-volume early stage lymphoma.
† For bulky mediastinal disease.
‡ Relapse/refractory disease setting. Adapted with permission from Dabaja et al.49
Constraints

• NCCN Hodgkin Lymphoma also provides a general set of tissue constraints

<table>
<thead>
<tr>
<th>OAR</th>
<th>Dose Recommendation (1.5–2 Gy/fraction)</th>
<th>Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>Mean &lt;15 Gy V20 &lt;30% V30 &lt;20%</td>
<td>Hepatic toxicity&lt;sup&gt;34, 35&lt;/sup&gt;</td>
</tr>
<tr>
<td>Stomach</td>
<td>D&lt;sub&gt;max&lt;/sub&gt; ≤45 Gy</td>
<td>Ulceration&lt;sup&gt;36&lt;/sup&gt;</td>
</tr>
<tr>
<td>Spleen</td>
<td>Mean &lt;10 Gy V5 ≤30% V15 ≤20%</td>
<td>Late infections&lt;sup&gt;37&lt;/sup&gt;  Lymphopenia&lt;sup&gt;38&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Minimize volume ≥36 Gy (especially to pancreatic tail)</td>
<td>Diabetes&lt;sup&gt;39&lt;/sup&gt;</td>
</tr>
<tr>
<td>Small bowel</td>
<td>V15 &lt;120 cc D&lt;sub&gt;max&lt;/sub&gt; &lt;45 Gy</td>
<td>Diarrhea&lt;sup&gt;36&lt;/sup&gt; Obstruction, ulceration, fistula&lt;sup&gt;36&lt;/sup&gt;</td>
</tr>
<tr>
<td>Kidneys</td>
<td>Mean &lt;8 Gy V10 &lt;30% V20 &lt;15% (recommended); &lt;25% (acceptable)</td>
<td>Renal insufficiency&lt;sup&gt;40, 41&lt;/sup&gt;</td>
</tr>
<tr>
<td>Bone marrow&lt;sup&gt;6&lt;/sup&gt;</td>
<td>V5: ALARA&lt;sup&gt;C&lt;/sup&gt; V10 &lt;50% V25 &lt;25%</td>
<td>Acute cytopenias&lt;sup&gt;42, 43&lt;/sup&gt; Chronic cytopenias&lt;sup&gt;44&lt;/sup&gt;</td>
</tr>
<tr>
<td>Long bone</td>
<td>V40 &lt;64%</td>
<td>Fracture&lt;sup&gt;45&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

**SECONDARY MALIGNANCIES<sup>f</sup>**

<table>
<thead>
<tr>
<th>OAR</th>
<th>Dose Recommendation (1.8–2 Gy/fraction)</th>
<th>Secondary Malignancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>Minimize volume &gt;4 Gy (ideally &lt;10%)</td>
<td>Breast cancer (adenocarcinoma)&lt;sup&gt;46&lt;/sup&gt;</td>
</tr>
<tr>
<td>Esophagus</td>
<td>Minimize volume &gt;30 Gy</td>
<td>Esophageal cancer&lt;sup&gt;47&lt;/sup&gt;</td>
</tr>
<tr>
<td>Stomach</td>
<td>Minimize volume &gt;25 Gy</td>
<td>Gastric cancer&lt;sup&gt;48&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Minimize volume &gt;5–10 Gy</td>
<td>Pancreatic cancer&lt;sup&gt;49&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Hodgkin Lymphoma (Age ≥18 years), NCCN Guidelines Version 2.2023, 11/08/22
Back to our 70yo patient...

• Definitive ISRT of 30 Gy in 20 fractions was recommended with MIBH delivered using MR-guided LINAC
  – MRgRT due to hiatal hernia to minimize volume and allow for adaptive planning if needed.

• Potential RT-related effects
  – Acute: fatigue, nausea, dermatitis, esophagitis, diarrhea.
  – Subacute/Late: Gastric ulceration, renal dysfunction, heart disease, pneumonitis, and secondary malignancy.
Back to our 70yo patient...

• Prescription & constraints
  – PTV_p: D95% ≥ 99% Rx PTV_p
  – Bowel: Dmax < 33 Gy
  – Heart*: Mean < 7 Gy
  – Kidneys: V18 < 33%
  – Kidney L/R: mean < 7 Gy
  – Liver-GTV: > 700cc < 15 Gy
  – Spinal cord: D0.5cc ≤ 35 Gy
  – Lungs*: Mean < 7 Gy

* Heart & lung constraints are higher than typical for gastric MALT given hiatal hernia and partial intrathoracic location of stomach & GTV.
Target Delineation

- ITV = change in position between CT and MR simulation scans
Treatment Plan*

* Adapt treatment daily if stomach moved outside of the 24 Gy IDL (not 30 Gy)
Treatment Plan

![DVH Graph](image)

- **Structures**
  - Skin
  - Bowel_Large
  - Bowel_Small
  - CTV_stomach
  - Duodenum
  - Esophagus
  - GTV_PET
  - Heart
  - ITV_stomach
  - Kidney_L
  - Kidney_R
  - Liver
  - Lung_L
  - Lung_R
  - PTV_stomach
  - SpinalCord

![Structure Colors](image)
Follow-up

• Typically, q3-6m for 5y then annually or no FU
  – Note minimum time to CR is roughly 6 months, and typically can take twice as long

• EGD 3m post-tx with biopsy, q3-6m until resolution, then annually
  – Sooner than 3m post-tx if symptomatic/there’s concern

• As for our patient, she had CR following XRT with no evidence of MALT on biopsy
References

1. Leukemia and Lymphoma Society, MZL
2. Non-Hodgkins Lymphoma, American Cancer Society
4. Radonc Review, Heme
5. B-Cell Lymphomas, NCCN Guidelines Version 2.2023, 02/08/23


13. ClinicalTrials.gov Identifier: NCT03680586

14. ClinicalTrials.gov Identifier: NCT04097067
Thank you!

- Please provide feedback regarding this case or other ARRO cases to arrocase@gmail.com